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HEPATICAE OF INDIA—A TAXONOMIC SURVEY AND CENSUS IV. LEJEUNEACEAE*

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ABSTRACT

In Part I was reviewed taxonomy of Indian Hepaticae since Mitten and lacunae and areas of further investigation in the group were also discussed. Part II dealt with families Takakiaceae through Marsupellaceae and Part III with Plagiochilaceae through Pleuroziaceae. Under both-were listed currently recognised genera and valid species, and hitherto known synonyms, critical notes and keys to identification of species where warranted. Distribution of genera and species in need of revision was also given. In this paper a taxonomic survey of the family Lejeuneaceae is dealt with. The various genera, species, their correct nomenclature and distribution are presented.

LEJEUNEACEAE

ARTIFICIAL KEY TO GENERA

1. Underleaves absent, minute or small, yellowish-green plants; rhizoids of stem; leaf apex usually acute, subacute or blunt, lobuli with two apical teeth; perianth beaked, 3-5 carinate, inflated 2

1. Underleaves present ... 4

2. Apical teeth closely juxtposed, sinus nearly closed; heterophyllus; leaves polymorphic, some with vestigial lobuli; gemmae only on leaf-margins; perianth obovoid, 5-carinate or ecarinate ... *Aphanolejeunea*

2. Apical teeth usually well apart; gemmae not confined to margins of lobes ... 3

3. Perianth obovoid, 5-carinate, the dorsal keel sometimes low; mature leaves with apical cells chlorophyllose; plants delicate ... *Cololejeunea*

3. Perianth obcordate, flattened, the dorsal (and sometimes postical) keels obsolete or absent; mature leaves with apical cells modified, forming a cluster of finger-like hyaline cells; plants robust ... *Leptocolea*

4. Underleaves as many as lateral leaves, duplicated ... 5

4. Underleaves half as many as lateral leaves ... 6

5. Leaves narrow and slender, with specialized lobule; perianth with keels horned, stem with rows of ventral merophytes, holostipous ... *Colura*

5. Leaves broadly ovate, rounded at apex, the lobule unspecialized; perianth with keels smooth; stem with two rows of ventral merophytes, schizostipous ... *Diplasiolejeunea*

6. Lobule well-developed, inflated or not, always lying parallel to stem, attached to it by a narrow, slit-like base, helmet-shaped; underleaves bifid, perianth always beaked ... 7

6. Lobule normally inflated, lying parallel to posterior leaf-margin and attached to it by a long keel, rarely lobuli vestigial 8

7. Leaves usually rounded at apex; plants deep green to reddish to purplish-brown, on drying not blackish; plants on dry rocks or bark ... *Frullania*

7. Leaves (at least when young) apiculate at apex; plants commonly black in drying; plants of wet, deeply shaded areas ... *Jubula*

8. Underleaves simple, never bifid; usually fuscous, stems usually with 12 or more rows of cortical cells; ventral merophytes usually 4 or more cells broad ... 9

8. Underleaves bifid, rarely shallowly so, greenish, never fuscous or distinctly brown; stem always with 7 rows of cortical cells, the ventral merophytes 2 cell rows broad ... 21

9. Subfloral innovations present ... 10

9. Subfloral innovations absent ... 19

10. (*a*) Vegetative branches of *Radula*-type; shoots not sharply dimorphic, the

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Abbreviations used:

A, Assam, *B*, Bhutan. *E H*, Eastern Himalayas. *H*, Himalayas. *I O*, India Orientalis. *K H*, Khasia Hills. *Kashyap*, Kashyap, Liverworts of Western Himalayas and the Panjab Plain, I & II, 1929, '32. *Macvicar*, Macvicar, Students Handbook of Hepaticae, 1925. *Mitt.*, Mitten, J. Proc. Linn. Soc. Bot. Lond. 4, 1860. *Mueller*, Die Lebermoose in Rabenhorst's *Kryptogamenfl.* 1909-12. *N*, Nepal. *S*, Sikkim. *S I*, South India. *Spr.*, Spruce, Trans. Proc. Bot. Soc. Edinb. 15, 1884-85. *Steph.*, Stephani, Species Hepaticarum, 1-6, 1900-24. *W H*, Western Himalayas.

branches not descending; ventral merophytes 4 or more cell rows broad, gynoecia on short or elongate branches with 1-2 innovations; female bracts with well-developed lobuli ... 12

10. (*b*) Vegetative branches of *Frullania*-type ... 11

11. Perianth trigonous, dorsiventrally compressed, obcordate, with dentate lateral keels; usually with ascending secondary branches; ventral merophytes 2 cell rows broad; gynoecia on usually elongate branches with 2 innovations; leaves usually with 2-4 sharp subapical teeth; female bracts with lobuli small to vestigial; androecia with bracteoles throughout ... *Dicranolejeunea*

11. Perianth with 8-12 carinae (even when young); rest as under 10 (*a*) ... *Ptychanthus*

12. Leaves, underleaves, bracts and bracteoles dentate, at least near gynoecia; lobule with a single apical tooth; gynoecia usually with 1 innovation; perianth trigonous when young, on maturity 5-7 carinate ... *Spruceanthu*

12. Leaves, underleaves, bracts and bracteole entire-margined; (dentate in *Thysananthus* where perianth trigonous with ± toothed keels); gynoecia with 1-2 innovations; lobule with 2 or more marginal teeth ... 13

13. Perianths usually with 6-16 (rarely 3-5) rounded, smooth, fold-like plicae; lobuli with 2-9 marginal teeth, hyaline papilla entally displaced, proximal to apical tooth; female bracts various, usually with keels winged; gynoecia usually with 2 (occasionally 1) innovations, consequently gynoecia in the form of a dichotomy; (occasionally branches of *Frullania*-type) ... *Brachiolejeunea* 14

14. Lobule with 4 small marginal teeth, both perichaetal bracts lobulate but lobuli associated, strongly unequal and keel without wings, the louble associated with innovation very small; innovation single, perianth half-emergent, becoming stipitate on maturity, keels smooth, noncristate; underleaves short decurrent, non-cordate, cuneately narrowed ... subg. *Stipitilejeunea*

14. Lobule with 2(-3) marginal teeth; one of the perichaetal bracts elobulate, the other with a broad, short lobule, keel wingless; innovations almost constantly 2; perianth immersed within the bracts except for the distal one-third or less; keels of perianth strongly inflated, contorted-undulate above and more or less winged ... subg. *Trocholejeunea*

13. Perianth 3-5 carinate, the carinae usually sharp; lobuli with 1-3 marginal teeth; gynoecia on long leafy shoots; usually with 1 innovation; both female bracts lobulate, keel without wings ... 15

15. Perianth normally 5-carinate (the antical keel often low and short, rarely 6-carinate); lobule margins smooth, with 1 (-2) teeth, hyaline papilla marginal or only slightly entally displaced; gynoecia always with a single innovation ... 16

15. Perianth trigonous, terete or eplicate; androecia on short or elongated branches with bracteoles throughout; lobuli with 2 or 2-3 marginal teeth, hyaline papilla entally displaced ... 17

16. Hyaline papilla distal, in the sinus; plants without secondary pigments, prostrate, secondary branches not ascending; androecia on short lateral branches with bracteoles restricted to base ... *Leucolejeunea*

16. Hyaline papilla proximal, entally displaced; plants brownish when mature, with secondary pigments; secondary branches ascending, primary stem prostrate; androecia throughout... *Archilejeunea*

17. Perianth sharply trigonous, occasionally with weak secondary plicae when mature; underleaves nearly transversely inserted and hardly decurrent; nearly obdeltoid or even emarginate, never reniform ... 18

17. Perianth compressed with broad low postical keel that may be obsolete; underleaves orbicular to reniform; leaves, underleaves and bracts often dentate; lobule normally with 3 marginal teeth ... *Marchesinia*

18. Leaves, underleaves, bracts and sometimes perinath keels dentate to serrate-dentate; androecia on short, lateral branches, diandrous ... *Thysananthus*

18. Leaves, underleaves, bracts and perianth keels smooth, entire-margined; androecia on leading shoots, bracteoles throughout, monandrous ... *Mastigolejeunea*

19. Vegetative branches of *Frullania*-type, stem cladia for asexual reproduction; leaves acute, more or less serrate; bracteoles bilobed and dentate; lobule usually without a distinct apical tooth; perianth compressed, trigonous; gynoecia on short lateral branches ... *Bryopteris*

19. Vegetative branches of *Radula*-type, without stem cladia; leaves entire-margined, bracts and bracteoles entire or occasionally dentate; perianth 5-12-carinate; lobuli with 2-5 marginal teeth; gynoecia on more or less elongate shoots ... 20

20. Perianth with 4 sharp carinae, keels winged, dentate to laciniate; bracts toothed with obsolete lobuli, the large lobe toothed, lobuli with a single ill-defined apical tooth ... *Lopholejeunea*

20. Perianth deeply (4) 5-12 carinate, keels smooth; lobuli with 2-5 marginal teeth; female bracts with discrete lobuli, lobes entire ... *Ptychocoleus*

21. Hyaline papilla distal, lobuli always inflated, ovoid to flask-shaped to

narrowly ovoid, usually with sharp apical tooth; leaves and underleaves never densely imbricate; usually without ocelli; microphyllous shoots absent; stem anatomy normally schizostipous, rarely holostipous; perianths basically 5 carinate, often the antical keel low and broad or vestigial, the postical carinae often obtuse and coalescent; caducous leaves sometimes present ... *a*

(*a*) Leaf lobes broadly rounded at apex; lobes of female bracts rounded to blunt at apex, their lobuli well-developed ... *Cheilolejeunea b*

(*b*) Lobuli usually broad and rather short, rarely (on stem leaves) over 0.5 the length of lobe, at the apex always with 1-celled apical tooth; the distal hyaline papilla in a discrete notch, ocelli absent ...

(*c*) Apical tooth sharply differentiated, acuminate, 3-6 times longer than broad; underleaves always small, usually cuneate at base, remote, up to twice as broad as stem; often with caducous leaves ... subg. *Cheilolejeunea*

(*b*) Lobuli usually narrow and slender, 0.6-0.8 the length of lobe, the apical tooth prominent, two to several cells long, formed of hardly or moderately elongated cells; underleaves small to remote ... subg. *Xenolejeunea*

(*a*) Leaf lobes deflexed, acute to longly apiculate; female bracts with lobes similarly acute to longly apiculate, with obsolete lobuli ... subg. *Strepsilejeunea*

21. Hyaline papilla proximal ... 22

22. Lobuli bidentate, hyaline papilla entally displaced, situated under the base of the apical tooth, lobe and lobule very narrowly inserted on the axis; asexual reproduction by means of discoid gemmae; stem anatomy typically schizostipous, perianth basically 5 carinate; underleaves bilobed, often deeply so; bracteole adnate to one of the bracts at base ... *Tuyamaella*

26. Rhizoid initial area with cells smaller and numerous, forming distinct discs; dorsal lobes often elliptical too oval, at times acute, rarely acuminate; perianth keels smooth ... *Leptolejeunea*

26. Rhizoid initial area with cells similar to the surrounding cells, not or rarely forming a disc; dorsal lobes often falcate and acuminate; perianth keels rough and often spinose ... *Drepanolejeunea*

27. Plants very firm, with convex cells, coarse to confluent trigones; ocelli various; gynoecia on leading shoots with 1 innovation; microphyllous shoots often developed, leaves and underleaves densely imbricate ... *Pycnolejeunea*

27. Plants more or less delicate; cells not strongly convex, trigones absent or small, occasionally large ... 28

28. Perianths obcordate; sharp dorsal and postical keels absent; leaves usually denticulate; without ocelli, without gemmae ... *Prionolejeunea*

28. Perianths 4-5 carinate, not strongly obcordate, not or weakly compressed; leaves entire-margined ... 29

29. Perianths not strongly compressed, 5-carinate (or rarely carinae obsolete and then perianth terete); without caducous leaves ... 30

29. Perianths strongly compressed, the antical keel low or absent, 2-4 carinate usually; cauducous leaves usually present; underleaves often unidentate or angulate on sides; marginal leaf-cells small, cells usually ± equally thick-walled ... *Rectolejeunea*

30. Gynoecia on normally short lateral branches, with innovations, the latter swiftly fertile, the secondary fertile shoots again fertile leading to cymose clustered gynoecia; underleaves usually cordate at base; leaves often acute to subacute at apex ... *Taxilejeunea*

30. Gynoecia with or without innovations; when present, never repeatedly fertile ... 31

31. Almost always with 1 (or 0) innovation; underleaves not cordate at base, usually small and distant; leaf not with strongly decurved apex, apex cells with small or no trigones ... 32

31. Almost always or frequently with 2 innovations and the perianth in the fork of dichotomy; underleaves usually cordate and very large, ± imbricate leaves convex, with decurved and often acute apices; cells usually with large trigones ... *Hygrolejeunea*

32. Perianth with carinae smooth, not expanded above, without asexual reproduction; gynoecia with 0-1 innovation ... *Lejeunea a*

(*a*) Lobuli usually, at least in part inflated, vestigial lobuli, if present, with apical tooth 1-2, rarely 2-4, cells long; underleaves usually nearly or quite as wide as long, rarely to 1.25 as long as wide; ocelli absent; stem with medullary cells 3-numerous; plants robust [600-1,250 (1,600) μ wide]; lobes widely spreading; ca 60-75°, their length 2-4 times that of the well-developed lobuli; lobuli small, their area 0.65-0.25 that of lobes ... subg. *Lejeunea*

(*a*) Lobuli, at least in part, very large, their area 0.4-0.8 that of lobes, occasionally some reduced to vestigial; ocelli often present at base of lobe (rarely also of lobule); underleaves small to remote, their lobes 2-3 (4) cells broad at base; gynoecia on leading or leafy branches usually, never cladogynous; almost always dioecious and sterile; stem with medulla of 3 cell-rows; plants minute to small, 200-550μ wide; lobes suberect to obliquely spreading (10-25, rarely 45°), their length usually 1.2-1.8 that of inflated lobule ... subg. *Microlejeunea*

32. Perianth with carinae umbonate to auriculate above; gynoecia always with 1 innovation, with gemmae (at least of some species), ocelli usually present ... *Otigoniolejeunea*

Frullania Raddi in Atti Soc. Ital. di Modena 18: 20, 1820.

F. apiculata (R.B.N.) Dum., Rec. d'Obs. 13; Clark, Bryol. 58: 68, 1955. *Jungermannia apiculata* R.B.N., Nova Acta Acad. Caes.-Leop. 12:222, 1825. *F. explicata* Mont., Ann. Sci. Nat. 2, 19: 256, 1843. *F. martensiana* Lindb., in G.L.N., Syn. Hep. 446, 1845. *F. pacifera* Tayl., Lond. J. Bot. 406, 1846. *F. angustata* Mitt. p. 122. *F. oceana* Mitt. in Seeman, Fl. viti., p. 417. *F. uncifolia* Gottsche, cf. Steph. 4: 490. *F. relicta* Steph., *F. acutistipula* Steph., *F. capillariformis* Steph., *F. pallida* Steph., *F. crenatiloba* Steph., *F. pandanicola* Steph., 4: 542, 550, 639, 671; 6: 553. *F. apiculata* f. *aculeata* Verdoorn, *Nova Guinea* 14 *Bot.* 4: 543, 1930. *F. apiculata* f. *explicata* (Mont.) Schiffn., *Oestr. bot. zeit.* 60: 431, 1910. *F. apiculata* var. *obscura* Nees, in G.L.N. Syn. Hep., p. 452, *F. apiculata* var. *warburgii* Verd., Ann. bryol. suppl. 1: 101, 1930. *Jubula vittata* Steph., 4: 692.

India (SI, KH), Ceylon, Malaya, Pacific Isls, N. & S. America, Europe.

F. arecae (Spreng.) Gottsche, *Kongl. Danske Vidensk.* Selsk. Skrift. 6: 332, 1867; Svilha, Bryol. 59: 277, 1956. *Jungermannia arecae* Spreng. *Neue Entdeck.* Pflanzenk. 2: 99, 1821. *J. ecklonii* Spreng. Syst. Veg. 4, 2: 324, 1827. *J. hians* Lehm. Pug. Pl. 4: 55, 1832. *Frullania hians* (Lehm.) Mont. et Nees, Fl. Boliv. d'Orbigny Voy. dens l'Amer. Merid. 72: 69, 1839. *F. hians* var. *japonica* G.L.N. Syn. Hep. 414: 1845. *F. mundiana* L. & G. in G.L.N. *l.c.* 772. *F. emergens* Mitt. in J. Linn. Soc. Lond. 7: 168, 1864. *F. wallichiana* Mitt. l.c. 118. *F. arecae* (Spreng.) Spr., 20. *F. indica* Steph. 4: 347. *F. ecklonii* Sim. in Trans. roy. Soc. Sth. Afr. 15: 38, 1926.

India (S, WH, KH, Madras, Nilgiri), N. & S. America, Africa.

J. delavayi Steph. in Hdw. 33: 157, 1894.

India (EH, N), China.

F. neurota Tayl. in J. Bot. 5: 400, 1846; Svilha, Bryol. 59: 277, 1956. *F. breviuscula* Mitt. in *J. Linn. Soc. Lond. Bot.* 5: 120, 1861. *F. sandvicensis* Angstr. Kongl. Vetensk. Acad. Forsch. 29: 28, 1872. *F. aongstroemii* Evans in Trans. Ct. Acad. Art. Sci. 10: 395, 1900. *F. lauterbachii* Steph. 4: 350.

India (SI, S, H), Nepal, N. America.

F. nodulosa (R.B.N.) Nees in G.L.N. Syn. Hep. 433, 1845; Verd. in Ann. bryol. suppl. 1: 117, f. 294-304, 1930; Clark & Svilha in Bryol. 50:381, 1947; Kamimura, in J. Hattori bot. Lab. 24: 57, f 21 (1-15), 1961. *Jungermannia nodulosa* R.B.N. in Nova. Acta. 12: 217, 1824. *J. replicata* Nees, Fl. Brasil. 1: 369, 1833. *Frullania secundiflora* Mont. in Ann. Sci. Nat. Bot. 2, 19: 258, 1843. *F. cognata* Lindenb., in G.L.N., Syn. Hep., p. 433, 1845. *F. thuillieri* Nees, *op. cit.* 434. *F. replicata* Spr. 38. *F. depitana* Steph., *F. brotheri* Steph. in Hdw. 33: 150, 1894. *F. ledermanni* Steph. 6: 552.

India (SI), widely in tropical and subtropical regions of world.

F. muscicola Steph. in Hdw. 33: 146, 1894; 4: 444; Kashyap, 2: 14, pl. 1 (10-12); Kamimura, *op. cit.* 21, f. 6 (1-47). *Frullania himalayensis* Steph. 4: 441.

India (N), China, Taiwan, Japan, Korea, Manchuria, Sakhalin.

F. chinensis Steph. 4: 469. *F. truncatifolia* Steph. in Yoshinaga, Bot. Mag. Tokyo 17: 38, 1903. *F. purpurascens* Steph. 4: 523. *F. uematuana* Byrd.; cf. Steph. 6: 543. *F. fauriana* var. *yoshinagana* Hattori in Bull. Tokyo, Sci. Mus. 11: 155, 1944 *F. dilatata* (acut non Linn.) Dum. in Mitt. Trans. Linn. Soc. Lond. 2, 3: 302, 1891. *F. paryistipula* Steph. ex Ashiba, cf. Steph., 4: 397. *F. squarrosa* Nees, cf. Kamimura, *op. cit.*

India (WH, upper A), China, Japan, Korea.

(*F. squarrosa* Nees and *F. muscicola* Steph. are closely allied and possibly identical—Kashyap, 2: 11).

F. squarrosa (R. B. N.) Dum., Rec. d'Obs., p. 13; Verd., Ann. bryol. suppl. 1: 34, f. 18-21, 130-32, 1930; Kashyap, 2: 11, pl. 1 (1-5); Kamimura, *op. cit.*, p. 177, f. 4 (1-8). *Jungermannia squarrosa* R. B. N., Nova Acta Acad. Caes. Leop.-Carol. 12: 219, 1824. *Frullania squarrosa* var. *ericoides* (Nees, p. sp.) Schiffn., Oestr. bot. zeit. 49: 9, 391, 1899. *F. sylvestris* Steph., *F. symmetrica* Steph. Rev. bryol. 35: 29, 1908. *F. luzonensis* Steph., *F. longispica* Steph., *F. vesiculosa* Steph., *F.*

rotundiloba Steph., *F. subnigra* Steph., 4: 477, 451, 457, 679, 544; *F. milkawana* Steph. (in sched.).
India (WH, S, SI), Nepal, Ceylon, Japan, Oceania, N. & S. America, Africa, Bermuda. etc.

Frullania monoliata (R. B. N.) Mont. subsp. **obscura** Verd. in Ann. bryol. Suppl. 1: 80, 1930. *Jungermannia monoliata* R. B. N. in Nova Acta Acad. Caes. Leop.-Carol. 12: 224, 182, 4 (pp.). *Frullania monoliata* Mont. in Ann. Sci. Nat. 2, 13: 13, 1842 (p.p.). *F. tamarischi* (non Dum.) Sande.-Lac. in Miquel Ann. Mus. Lugd.-Bot. 1: 313, 1863-64. *F. appendiculata* Steph. in Bull. Herb. Boiss. 5: 88, 1897. *F. clavellata* Mitt. in Trans. Linn. Soc. Lond. 2, 3: 203, 1891. *F. monoliata* subsp. *obscura* f. *appendiculata* Verd. in Mazetti, Simb. Sinic. 5: 42, 1930.
India (SI), Ceylon, Sumatra, Java, Sanghalin, China, Taiwan, Japan.

F. nepalensis (Spreng.) Lehm. et Lindenb. in G. L. N. Syn. Hep. 422; Kamimura, *op. cit.* 55, f 20 (1-13).
India (N, S, B, A), Burma, Siam, China, Sumatra, Java, Philippines, Celebes, Malaysia, Japan, Korea(?).

F. riparia Hampe in Lehm. Strip. Pug. 7: 14, 1838. *Frullania aeolotis* Mont. et Nees in Nat. Europ. Leberm. 3: 210, 1838. *F. wrightii* Austin in Bull. Torrey bot. Clb. 3: 15, 1872. *F. aeolotis* Nees in G. L. N. Syn. Hep. 417.
India (WH, S, KH), Japan, N. America, Europe, Mexico, Asia.

F. retusa Mitt. 119; Kashyap, 2: 13, Pl. 1 (6-9).
India (WH, N).

F. gracillima Steph. 4: 437; Kashyap, 2: 14, Pl. 1 (13-15).
India (WH, IO).

F. gracilis (R. B. N.) Dum. also occurs in Indo-Malaya (J. Hattori Bot. Lab. 8: 30).

F. pyriflora Steph. 4: 443; Kashyap, 2: 15, Pl. 2 (1-13).
India (WH).

F. grevilleana Tayl. ex Gott, L et N, Syn. Hep. 421; Kashyap, 2: 16, Pl. 12 (4-7).
India (H, N, S).

F. hampeana Nees, cf., Robinson, J. Hattori bot. Lab. 27, 129, 1964.
India.

F. yunnanensis Steph.; Hdw. 33: 161; Hattori (1968).
India (EH), China.

Other species mentioned in Stephani (4) are:

F. *breviramea* Steph. 547	IO
campanulata Sande.-Lac., cf. Steph. 442 ...	SI
duthiana Steph. 351	WH
gauduchaudii Nees & Mont., cf. Steph. 523 ...	SI
glomerata L. et L., cf. Steph. 384	SI
gollani Steph. 445	WH
laxipinnata Steph. 457	S
orbicularis Austin, cf. Steph. 557	S, N
orientalis Sde.-Lac., cf. Steph. 615	IO
rotundiloba Steph. 679	S
subclavata Steph. Tayl. 354	S
polyptera cf. Steph. 439	N
recurvata L. et L. cf. Steph. 685	SI
serrata Gottsch., cf. Steph. 478	SI

Additional species described by Mitten (pp, 119—121) are the following:

F. rogosa Mitt.—Caule procumbente pinnato, foliis divergentibus oblongis apice rotundatis, lobulo galeiformi compresso decurvo, amphigastriis subrotundis breviter bifidis, perianthio obovato, dorso plano, ventre leviter unicarinato tota superficie laciniolis obtecto, foliis involucralibus ovatis accuminatis basi cum amphigastrio connatis.
Habitus faciesque *F. spiniferae* Tayl.; lobulus autem basi truncatus perianthium ubque *F. laciniosae* et *F. pycnanthae a* quibus tamen forma directioneque foliorum diversa.
(*KH, Ceylon, Cochin-China*)

F. physantha Mitt.—Caule procumbente pinnato, foliis divergentibus ovatis obtusis, lobulo parvo galeato decurvo evolutove, amphigastriis orbiculatis integris undulatis, perianthio magno ovato, inferne inflato laevi, apice truncato quinqueplicato, angulis suberenatis, foliis involucralibus obtuse angulatis amphigastrio ovato bidentato. Statura *F. rugosae* similis, colore habituque conveniens; perianthia vero monstrosa fere in omnibus speciominibus, in paucis tamen isomorpha.
(*KH*)

F. evoluta Mitt.—Caule bipinnato gracili, foliis divergentibus ovato-rotundatis apice obtuso subangulatove, lobulo parvo oblongo cylindrico caule incumbente, in caule primario saepe evoluto, perianthio oblongo obtuso trigone, foliis involucralibus acutis integerrimis.

F. apiculatae similis, sed lobulo incumbente. (*HO*)

F. asperula Mitt.—Caule procumbente pinnato, foliis divergentibus ovali-orbiculatis, lobulo brevi galeiformi, amphigastriis ovatis bifidis, sinu laciniisque acutis, perianthio compresso unicarinato, foliis involucralibus acutiusculis integerrimis.

F. rugosae affinis, diversa tamen cellulis interstitiis angustioribus, amphigastriis ovatis dentibus acutioribus, perianthio minus aspero et foliis involucralibus obtusioribus basi non coadunatis. (*Khasia*)

F. subinflata Mitt.—Caule procumbente brevi, foliis patentibus orbiculatis, lobulo magno obovato subinflato cauli parallelo, amphigastriis parvis ovali-oblongis ad tertiam partem excisis, perianthio obovato subcuneato compresso, dorso laevi, ventre bicarinato, foliis involucralibus rotundatis integerrimis. Habitu *F. dilatatae*, sed brevior et lobulo obovato, plicatione perianthii a confinibus satis diversa. (*Madras*)

F. inflexa Mitt.—Caule procumbente pinnatim ramoso, foliis patentibus orbiculatis, lobulo oblongo compressulo apice caulem attingente, amphigastriis oblongo-rotundatis breviter bifidis, perianthio ovato-oblongo obtuso triquetro, follis involucralibus acutiusculis integerrimis. Statura *F. dilatatae*, sed lobulus angustior apice caule inflexus. (*Sikkim*)

F. acutiloba Mitt.—Caule procumbente subpinnatim ramoso, foliis patentibus cordato-ovatis obtusis, lobulo galeiformi decurvo basi extus spiniformi acuminato, amphigastriis ovatis breviter bifidis dentibus acuminatis, foliis involucralibus acuminatis integerrimis. *F. dilatata* robustior et apiculatione lobulorum. *F. hampeaneae, F. spiniferaeque* affinis.
(*Nilgiri Hills*).

Jubula Dum. in Comm. Bot. 112, emend Rec. d'Obs. 12. *Lejeunea* Corda in Opiz. Beitr. 652, 1825 (pp.). *Frullania* Nees in Nat. Eur. Leberm. 240 (pp.).

J. hutchinsiae (Hook.) Dum., *op. cit.* 12 *Jungermannia hutchinsiae* Hook. in Brit. Jungerm. 19, Pl. 19, 1816 (pp.).
India (S, SI)..

J. hutchinsiae subsp. **javanica** (Steph.) Verd. in Ann. de Crypt. ex 1: 215, 1928; Ann. bryol. suppl. 1: 22, f. 1, 2, 1930; Kamimura, J. Hattori bot. Lab. 14: 89, f. 31 (1-20), 1961. *Jungermannia hutchinsiae* Dum. Com. Bot. 112. *Frullania hutchinsiae* Nees, *op. cit.* 240. *Jubula javanica* Steph., *J. rostrata* steph. *J. inflata* Steph. *J. samoana* Steph. *J. setacea* Steph. *J. sikkimensis* Steph. *J. integrifolia* Steph. *J. trifida* Steph. 4: 688, 650, 689, 690, 691; 6: 555. *Frullania piligera* Austin in Bull. Torrey bot. Clb. 6: 301, 1899. *Jubula piligera* (Aust.) Evs. in Trans. Conn. Ac. 8: 253, 1891. *J. hutchinsiae* subsp. *javanica* f. *integrifolia* (Steph.) Hattori in Bull. Tokyo, Sci. Mus. 11: 156, f. 98, 1944. *J. hutchinsiae* subsp. *japonica* Horikawa et Ando in J. Sci. Hiroshima Univ. B, 2, 6: 300, 1954 (pp.).
India (S, SI), Japan, Taiwan, Tobago, Asia Minor, Java, Sumatra, New Guinea, Philippines, Samoa, Hawaii.

J. sikkimensis Steph. 4 : 691 ... ... S

Tuyamaella Hattori in *Biosphaera* 1: 6, 1947; Bull. Tokyo Sci. Mus. 11: 127, 1949. *Doliolejeunea* Herzog in Mem. Sci. Fauna Fl. Fenn. 26: 65, 1951.

T. angulistipa (Steph.) Schust. et Kachroo in J. Linn. Soc. Lond. Bot. 56: 505, 508, f. 14 (1-7), 1960. *Pycnolejeunea angulistipa* Steph. 5: 632.
India (S, IO), Japan.

Stictolejeunea (Spr.) Schiffn. in Engler & Prant. Nat. Pflanzenfam. 1 (3): 131, 1887: Evans in Bull. Torrey bot. Clb. 34: 1, 1907. *Lejeunea* subg. *Sticto-Lejeunea* spr. 81. *Jungermannia* Willd. in Weber, Hist. Musc. Hep. Prodr. 33, 1815 (pp.). *Phragmicoma* Nees et Mont. in Ann. Sci. Nat. Bot, 2, 19: 259, 1843. *Lejeunea* Nees in G. L. N. Syn. Hep. 322, 1845 (pp.). *Symbiezidium* Trev. in Mem. R. Ist. Lomb. 3, 4: 403, 1877 (pp.).

S. squamata (Willd.) Schiffn. *op. cit.* 131; Evans, *op. cit.* 5, Pl. 1 (1-16). *Jungermannia squamata* Willd. in Weber, op. cit. 33. *Phragmicoma ocellata* Nees et Mont. *op. cit.* 259. *Lejeunea squamata* Nees in G. L. N. *op. cit.* 322. *Symbiezidium squamatum* Trev., *op. cit.* 403, *Lejeunea* (*Stricto-Lejeunea*) *squamata* Spr. 82.
India (IO), America.
"..the evidence that *S. squamata* occurs in outside the American tropics is very inconclusive" (Evans, *op. cit.*, 2).

Bryopteris Lindenb. in Pug. Pl. Nov. 8: 23, 1844: Evans in Bull. Torrey bot. Clb. 34: 557, 1907. *Jungermannia* Swartz, Prodr. Fl. Ind. Occ. 145, 1788; Hooker, Musci exot. Pl. 142, 1819. *Frullania* subg. *Bryopteris* Nees in Natur. Eur. Leberm. 3: 211 (as a foot note), 1833. *Lejeunea* (*Bryolejeunea*) Spr. 113. *Frullania* Raddi in Mem. Soc. Ital. Modena, 19: 35, 1823 (pp.).

B. nepalensis Steph. 5 : 9 ... ... S, N

B. trinitensis L. et L., cf. Mitt. 109 ... ... H, N

"At all events I have never seen a *Bryopteris* in Indo-Malaya, also neither in Herb. Blume or Herb Nees..." "*B. trinitensis* which Sande-Lac. (Ann. Mus. 1. Bot. 1: 306) assigns to Sumatra belongs to *Thysananthus spathulistipa*"—Verdoorn in Ann. bryol. suppl. 4: 185.

Dicranolejeunea (Spr.) Schiffn. in Engler & Prantl Nat. Pflanzenfam. 1, 3: 128, 1887; Evans in Hep. Yale Peruvian Exped. 316, 1911. *Jungermannia* Nees in Fl. brasil. 1: 348. 1833 (pp.). *Lejeunea* Mont. et Nees in Ann. Soc. Nat. 2, 5: 59, 1836 (pp.). *Phragmicoma* Syn. Hep. 745, 1847 (pp). *Symbiezidium* Trev. in Mem. Ist. Lomb. 3, 4: 403, 1877 (pp.). *Ptychocoleus* Trev. *op. cit.* 405 (pp.). *Lejeunea* subg. *Dicrano-Lejeunea* Spr. 138.

D. gliva Steph. 5 : 170 ... ... S

D. sikkimensis Steph. 5 : 170 ... ... S

"The only Asiatic relative *Dicranolejeunea sikkimensis* Steph. from Sikkim has large rolled lobuli downwardly pointing amphigastria at the stem, united lobuli in the female involucre (in *D. javanica*, the female involucre is very small) with many cilia-like teeth, furnished lateral perianth keels, clearly developed ventral keel and a dioecious inflorescence. Of *D. gliva* Gottsche, I could only examine a fragment from Darjeeling (leg. *Wichura*)—the question is whether the mud form belongs to *D. javanica*, *D. sikkimensis* or another species"—Verdoorn in Ann. bryol. suppl. 4: 66.

Brachiolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1, 3: 128, 1887. *Frullania* Reddi in Jungerm. Etrusca 38, 1823 (pp.). *Jungermannia* L. et L. Pug. 4: 50, 1832 (pp.). *Lejeunea* Nees in Mont Fl. biliv. 66, 1839 (pp.); Mitt. 111. *Phragmicoma* in Syn. Hep. 294 (pp.). *Ptychocoleus* Trev. in Mem. R. Ist. Lomb. 3, 4: 405, 1877 (pp.). *Lejeunea* subg. *Brachiolejeunea* Spr. 129. *Mastigolejeunea* Steph. in Hdw. 28: 29, 1899; 4: 769. *Trocholejeunea* Schiffn. in Ann. bryol. 5: 160, 1932.

Brachiolejeunea sandvicensis (G.) Evans in Trans. Conn. Acad. Sci. 10: 419, 1900; Mizutani in J. Hattori bot. Lab. 24: 167, f. 11 (20-34), 1961. *Phragmicoma sandvicensis* Gottsche in Ann. Sci. Nat. 4(8): 344, Pl. 17 (10-24), 1857. *P. subsquarrosa* Austin in Proc. Ac. nat. Sci. Phil. 225, 1869. *P. polygona* Mitten in Trans. Linn. Soc. Lond. 3: 204, 1891. *Mastigolejeunea sandvicensis* Steph.: Hdw. 28: 29, Pl. 8, 9 (20, 31), 1899. *Lejeunea sandvicensis* Evans loc. cit. 8: 253, 1892. *Brachiolejeunea gottschei* Schiffn.; Hdw. 33: 186, 1894. *B. chinensis* Steph.; *B. innovata* Steph.; Hdw. 34: 63, 1912. *B. japonica* Steph.; Bull. Herb. Boiss. 5: 842, 1897. *Lejeunea (Acrolejeunea) sandvicensis* Steph.; J. de Bot. 12: 4, 1898. *Mastigolejeunea formosensis* Steph. 4: 769. *Brachiolejeunea sexplicata* Steph. *B. polygona* Steph. 4: 136. *Phragmicoma japonica* Gottsche (in sched.). *Ptychanthus japonicus* Steph. (in sched.), cf., Verd. in Ann. bryol. suppl. 4: 54, 1934.

India (Palni Hills, upper A), Japan, Taiwan, China, Tonkin, Annam, Tahiti, Hawaii, Korea.

B. infuscata (Mitt.) Schuster & Kachroo, comb. nov. *Lejeunea infuscata* Mitt. 111. *Trocholejeunea infuscata* (Mitt.) Verd. in Ann. bryol. suppl. 4: 190, 1934. *Acrolejeunea cordistipula* Steph.; Soc. Sci. Nat. Cherb. 207, 1894. *Brachiolejeunea birmensis* Steph. 5: 134. *Homalolejeunea levieri* Steph. in Schiffn., Oestr. Bot. zeit. 9, 1899. *Omphalanthus infuscatus* Steph. 4: 702. *Ptychocoleus cordistipulus* Steph. 5: 40. *Lopholejeunea infuscata* Steph. 5: 92. *Brachiolejeunea levieri* Schiffn., cf. Steph. 5: 134. *Trocholejeunea levieri* Schiffn. in Ann. bryol. 5: 160, f. 1-8, 1932.

India (S), Nepal.

Ptychocoleus Trev. Mem. Ist. Lomb. 3, 4: 405, 1877. *Jungermannia* R. B. N., Br. Act. 12: 211, 1824 (pp.). *Lejeunea* Dum. in Rec. d'Obs. 12; Taylor in Lond. J. Bot. 5: 392, 1846 (pp.). *Ptychanthus* Nees in Nat. Eur. Leberm. 3: 213, 1813 (pp.). *Phragmicoma* in Syn. Hep. 294 (pp.). *Symbiezidium* Trev. *op. cit.* 403 (pp.). *Lejeunea* subg. *Acrolejeunea* Spr. 115. *Acrolejeunea* Spr. 115; Schiffner in Nat. Pflanzenfam. 1, 3: 128, 1887. *Mastigolejeunea* Steph.; Hdw. 29: 9 (pp.), 1890; Schiffn. in Hdw. 33: 183, 1894 (pp.).

P. pycnocladus (Tayl.) Steph., Lond. J. Bot. 5: 385, 1846. *Ptychanthus pycnocladus* Taylor cf., Steph. *op. cit.* 52. *Lejeunea pycnoclada* Mitt. 111. *Acrolejeunea terminalis* Spr. 116. *Ptycholejeunea pycnoclada* Steph. Hdw. 28: 259, 1889. *Acrolejeunea cucullata* Steph.; Hdw. 29: 10, 1890. *A. rostrata @ minor* Schiffn. Forsch. Gaz. 4: 27, 1890, pl. 5 (18-20). *A. pycnoclada* Schiffn. in Nat. Pflanzenfam. 1, 3: 128, 1887. *A. subinnovans* Steph.; Hdw. 34: 59, 1895. *Ptychocoleus brunneus* Steph., *P. cucullatus* Steph., *P. pycnocladus* Steph., *P. subinnovatus* Steph., *P. terminalis* Steph., 5. *Ptychanthus gomphocalyx* Herz.; Mitt. Inst. allg. Bot. Hamb. 7: 200, f. 5 (1-q), 1931.

India (Andaman Isls.), Ceylon, Sumatra, Malaya, Java, Borneo, Philippines, New Guinea, Salomon Isls.

P. mangaloreus Steph. 5: 47; Verd. in Ann. bryol. suppl. 4: 130, 1934.

India (Mangalore).

P. saccatus (Mitt.) Steph. 5: 53. *Lejeunea saccata* Mitt. 111.

India (S, KH).

L. infuscatae similis, diversa tamen foliis magis divergentibus obtusioribus, colore pallidiore, amphigastriis majoribus, apices reflexis.

P. cristilobus Steph. 5: 41 ... ... S

P. fertilis (R. B. N.) Trev. in Mem. Ist. Lomb. 3, 4: 405, 1877. *Jungermannia fertilis* R. B. N. in Nova Acta 12: 211, 1824. *Lejeunea fertilis* Dum. in Rec. d'Obs. 12; Mitt. 111. *Phragmicoma fertilis*, in Syn. Hep. 299. *Acrolejeunea fertilis* Spr. 116. *A. wichurae* Schiffn., Hdw. 33: 187, Pl. 7 (1-7), 1894. *Brachiolejeunea micholitzii* Steph., *Ptychocholeus integribracteus* Steph., *P. wichurae* Steph., *P. tener* Steph., *Brachiolejeunea tortifolia* Steph. *Mastigolejeunea malaccensis* Steph. 6.

India (Nicobar Isls.), Sumatra, Penang, Malaya, Java, Philippines, Tahiti, New Guinea.

P. cumingianus (Mont.) Trev. *op. cit.* 405. *Phragmicoma cumingiana* Mont. in Lond. J. Bot. 4: 7, 1845. *Lejeunea cumingiana* Mitt. 110. *L. malaccensis* Tayl. in Lond. J. Bot. 5: 392, 1846. *Acrolejeunea malaccensis* Spr. 116. *A. novo-guinensis* Steph., *A. cumingiana* Steph., *A. luzonensis* Steph., *A. marqueana* Steph.; Hdw. 28: 165, 166, 1889 (in sched.). *A. densifolia* Schiffn. in Forsc. Gaz. 4: 26, 1900. *Mastigolejeunea javanica* Steph., *M. badia* Steph. 4: 778, 779. *Ptychocoleus densifolius* Steph., *P. grandifolius* Steph., *P. luzonensis* Steph., *P. malaccensis* Steph., *P. marquesanus* Steph., *P. novo-guineae* Steph., *P. sumatranus* Steph., *P. squarrosifolius* Steph. 5: 42, 43, 47, 48, 54, 55.

India (Nicobar Isls, Andaman Isls), Sumatra, Malaya, Java, Borneo, Philippines, Celebes, Ambon, Karoline, Q'land, Marques Isls, Samoa, Tahiti.

Ptychanthus Nees, Nat. Eur. Leberm. 3: 212, 1838. *Jungermannia* R. B. N. in Nova Acta 12: 214, 1824 (pp.). *Frullania* Mont. in Ann. Soc. Nat. 2, 17, 15, 1842 (pp.). *Bryopteris* Mitt.; Fl. viti. 411 (pp.). *Lejeunea* subg. *Ptycho-Lejeunea* Spr. 97. *Ptycholejeunea* Spr. 98,

P. striatus (L. et L.) Nees, *op cit.* 212; Mizutani in J. Hattori bot. Lab. 24: 148, f. 5 (1-17), 1961. *Jungermannia striata* L. et L. in Pug. 4: 16, 1832. *Frullania striata* Mont. in Ann. Sci. Nat. 2: 16. 1842. *Ptychanthus squarrosus* Mont. in Lehm. Pug. 8: 22, 1842. *P. wightii* Syn. Hep. 291; Mitt. 109. *P. javanicus* Sde.-Lac. in Ann. Mus. Bot. Lujd. 1: 307, 1863. *P. moluccensis* Sde.-Lac. in Gottsche, *loc. cit.* 291. *P. bidentatus* Herz. in Ann. bryol. 4: 85, 1931. *Bryopteris striatus* Mitt.; Fl. viti 414. *Ptycholejeunea dioica* Sim. in Trans. R. Soc. Afr. 15: 58. *P. javanica* Spr. 98. *P. moluccensis* Steph., *P. striata* Steph., Hdw. 28: 259, 1889. *P. birmensis* Steph., *P. nietneri* Steph., Hdw. 35: 120, 1896. *Ptychanthus nietneri* Schiffn. in Oestr. bot. zeit. 8, 1899. *P. africanus* Steph., *P. pallidus* Steph., *P. integrifolius* Steph., *P. acuminatus* Steph., *P. lorianthus* Steph., *P. brotheri* Steph., *P. grossidens* Steph. 4, 5. *Brachiolejeunea adnaemana* Steph. 5: 130. *Lejeunea stephensoniana* Mitt. in Fl. Nova. Zel. 2: Pl. 52, 1855. *Ptychanthus javanicus* var. *brevifolius* G. in Ann. Sci. Nat. 4: 8. Pl. 16 (1-9), 1858. *P. perrottettii* Steph., Hdw. 35: 221, 1896; Kashyap, 2: 20, Pl. 2.

India (WH, H, S, KH, Andamans), Ceylon, Magasay, Africa, Japan, China, Annam, Burma, Tonkin, Siam, Sumatra, Java, Malaya, Borneo, Sarawak, Celebes, New Guinea, Samoa, Australia, New Zealand.

P. striatus var. **perrottettii** (Steph.) Verd. in Ann. bryol. suppl. 4: 121, 1934. *Ptychanthus perrottettii* Steph., Hdw. 35: 221, 1896; Kashyap, 2: 8, Pl. 2 (8-12). *P. argutus* Steph. 4: 745.
India (H).

Thysananthus Lindenb. in Pug. Pl. Nov. 8: 24, 1844; Syn. Hep. 286; Evans in Bull. Torrey bot. Clb. 34: 552, 1909. *Lejeunea* Dum. in Rec. d'Obs. 12 (pp.). *Frullania* subg. *Bryopteris* Nees, Nat. Eur. Leberm. 3: 211, 1838 (pp.). *Lejeunea* subg. *Thysano-Lejeunea* Spr. 105. *L.* subg. *Dendro-Lejeunea* Spr. 110. *Thysanolejeunea* Spr. et Auct.; Sim. in Trans. R. Soc. Afr., 15: 50, 1926. *Dendrolejeunea* Spr. a et Auct. *Phragmicoma* Mitt. Fl. viti. 412 (pp.). *Mastigo-(Thysano-)-Lejeunea* Schiffn. in Forsch. Gaz. 4: 21, 1890.

T. gottschei (Jack et Steph.) Steph. 4: 787. *Thysanolejeunea gottschei* Jack et Steph., Hdw. 31: 20, Pl. 4 (24-27), 1892. *T. reversa* Steph., Hdw. 35: 139, 1896. *T. rigidus* Steph., *T borneensis* Steph., *T. reversus* Steph., *T rigidus* Steph., *T. subreversus* Steph., *T laceratus* Steph. 4: 786, 789, 790, 796. *Archilejeunea recurvimarginata* Steph. (in sched.). *Mastigo-(Thysano)-Lejeunea convoluta* var. *ornata* Schiffn. in Forsch. Gaz. 4: 21, 1890.

India (Andaman Isls), Sumatra, Borneo, Philippines, New Guinea, New Ireland.

T. spathulistipus (R. B. N.) Lindenb. op. cit., 287. *Jungermannia spathulistipa* R. B. N. in Nova Acta, 12: 212, 1824. *Lejeunea spathulistipa* Dum. in Rec. d'Obs. 12. *Frullania spathulistipa* Nees, Nat. Eur. Leberm. 211, 1838. *Phragmicoma spathulistipa* Mitt. Fl. viti. 412. *Thysanolejeunea spathulistipa* Spr. 106. *Mastigo-(Thysano)-Lejeunea amboinensis* Schiffn. in Gazelle Exped. 4: 22, Pl. 5, f. 13-15, 1890. *Thysananthus monoicus* Steph., *T. sikkimensis* Steph., *T. hebridensis* Steph. 4, 6.

India (A, S, Andaman Isls), Ceylon, Sumatra, Java, Malaya, Borneo, New Guinea, Celebes.

Spruceanthus Verd. Ann. bryol. suppl. 4: 151, 1934. *Jungermannia* Nees, Hep. Javan. 39, 1830 (in sched. pp.). *Ptychanthus* Nees, Nat. Eur. Leberm. 3: 212 (pp.), 1845. *Lejeunea* Mitt. 111 (pp.). *Ptycholejeunea* Spr. 99. *Brachiolejeunea* Steph., Hdw. 28: 168, 1889 (pp.). *Lejeunea* subg. *Phragmolejeunea* Schiffn. in Forsch. Gaz. 4: 25, 1890. *Thysananthus* subg. *Sicyanthus* Herz. in Sym. Sinic. 5: 46, 1930.

P. semirepandans (Nees) Verd. *op. cit.* 153; Mizutani in J. Hattori bot. Lab. 24: 16, f. 9 (1-19), (1961). *Jungermannia semirepandans* Nees, op. cit. 39. *Ptychanthus semirepandans* Nees, *op. cit.* 212. *Phragmicoma semirepanda* Syn. Hep. 302. *Lejeunea semirepanda* Mitt. 111. *Ptycholejeunea semirepanda* Spr. 99. *Thysananthus rotundistipulus* Steph. 6: 556. *T.* (?) *fragillimus* Herz. in Symb. Sinic. 5: 45, f. 16, 1930.
India (S, KH), Nepal, Ceylon, China, Java, Borneo, Philippines, Lembok.

S. polymorphus (Sde.-Lac.) Verd. op. cit. 155; Mizutani op. cit. 164, f. 9 (20-30). *Phragmicoma polymorpha* Sde.-Lac. in Nat. Tujdschr. N.I. 10: 396, 1856; Syn. Hep. Javan. 58, Pl. 11. *Brachiolejeuna* *polymorpha* Steph., Hdw. 28: 168, 1889. *Phragmilejeunea polymorpha* Schiffn. in Forsch. Gaz. 4: 25, 1890. *Thysanolejeunea polymorpha* Schiffn. in Nova Acta 40: 228, 1893. *Thysananthus polymorphus* Schiffn. in Conspec. 305 ; Evans in Conn. Acad. Sci. 10: 426, Pl. 49 (1-13), 1900. *Phragmicoma elongata* Austin in Proc. Ac. Sci. Phil. 225, 1869, 225. *Lejeunea aliena* Evs. *loc. cit.* 423. *L. elongata* Aust. in Bull. Torrey bot. Clb. 5: 17, 1874. *Dicranolejeunea didericiana* Steph. 5: 791. *Archilejeunea caledonica* Steph. 4: 727. *Thysananthus paucidens* Steph. 4: 793. *T crispatus* Steph. 6: 569. *Ptychanthus cristifolius* Steph. 6: 561. *Thysananthus elongatus* Evans, op. cit. 423. *Brachiolejeunea aliena* Steph. *Ptycholejeunea elongata* Steph. ; Bull. Herb. Boiss. 5: 842, 1897.

India (SI), Malaya, Sumatra, Borneo, New Guinea, Philippines, Celebes, Arrow Isls, New Caledonia, Tahiti, Hawaii.

Mastigolejeunea (Spr.) Schiffn. in Engler & Prantl. Nat. Pflanzenfam. 1, 2: 129, 1887. *Ptychanthus* Nees, Hep. Eur. 3: 212, 1838 (pp.). *Jungermannia* Wils et Hook. Drumm. Musci Am. S. Merid. 170, 1841 (pp.). *Phragmicoma,* in Syn. Hep. 299, 301 (pp.). *Lejeunea* Lindemb., Syn. Hep., p. 333 (pp.). *Thysananthus* Aengstr, ofv. af K. vet. Ak. Forh. 5: 131, 1873 (pp.). *Ptychocoleus* Trev. Mem Ist Lomb. 3, 4, 1877 (pp.). *Marchesinea* Trev. *op. cit.* (pp.). *Lejeunea* subg. *Mastige-Lejeunea* sectio *Trigonolejeunea* Spr. 100. *Tuzibeanthus* Hattori, Biosphera 1: 7, 1947.

M. repleta (Tayl.) Steph. Hdw. 29: 139, 1890. *Lejeunea repleta* Tayler in Lond. J. Bot. 5: 392, 1846; Mitt. 110. *Phragmicoma repleta,* in Syn. Hep. 742. *Lejeunea wardiana* Mitt. p. 109. *Brachiolejeunea wardiana* Steph. 5: 129. *Mastigolejeunea spectabilis* Steph., *M. wightii* Steph., *M. spiniloba* Steph., *M. indica* Steph. 4: 772, 773, 775, 776. *Brachiolejeunea tylimanthoides* Steph. 5: 129.

India (SI, Kh, B), Ceylon, Hongkong, Burma. Philippines.

M. humilis (G.) Schiffn. *op. cit.* 129; Mizutani in J. Hattori bot. Lab. 24: 156, f. 7, 1961. *Phragmicoma humilis* Gottsche, Syn. Hep. 299. *Ptychocoleus humilis* Trev. *op. cit.* 405. *Lejeunea guahmonsis* Lindemb. Syn. Hep. 333. *Mastigolejeunea guahamonsis* Steph., 4: 769; *M. virens* Steph., *M. virens* Steph., *M. laitica* Steph., *M. appendiculata* Steph., *M. longispina* Steph., *M. thysanathoides* Steph., *M. latiloba* Steph. 4: 773, 774, 775, 776, *M. losbanosa* Steph., *M. micholitzii* Steph. 6: 563, 564. *Thysananthus virens* Aonster, *op. cit.* 21. *Lejeunea virens* Steph.; *L. laitica* Steph. in J. de Botan. 12. 6. 7. *Mastigolejeunea minuta* Schiffner, Forsch. Gaz. 4: 23, 1890.

India (Andaman Isls), S. America, Anam, Ceylon, Java, Malaya, Philippines, Ambon, New Guinea, Duke of York Isl., Marian, New Pommeru, New Caledonia, Tahiti.

Subg. **Tuzibeanthus** (Hattori) Biosphaera 1: 7. 1947 (as genus)

M. (T.) chinensis (Steph.) Kachroo comb. novo. *Ptychanthus chinensis* Steph. 4: 744. *Tuzibeanthus porelloides* Hattori, op. cit. 5 (nom. nud.). *Mastigolejeunea porelloides* (Hatt.) Schuster, Bryol. 64: 167, 1961. *Lopholejeunea yokogurana* Kamimura in Acta Phytotax. Geobot. 14: 107, f. 1. 1952. *Tuzibeanthus chinensis* (Steph.) Mizutani in J. Hattori bot. Lab. 24: 151, f. 5 (18-26), 1961. India (WH, S), China, Japan.

While working on the revision of genera and subgenera of the Lejeuneaceae Schuster and Kachroo (1956, sched.) found that *Tuzibeanthus* could only be recognized as a subgenus of *Mastigolejeunea* and consequently *T. porelloides* Hattori was transferred to *Mastigolejeunea.* Recently Schuster (Bryol. 64: 167, 1961) has validated this transfer.

Lopholejeunea (Spr.) Schiffn. in Engl. & Prantl. Nat. Pflanzenfam. 1(3): 129, 1887. *Jungermannia* R.B.N. Acta Nova 12: 210, 1824 (pp.) *Phragmicoma* Nees, Nat. Eur. Leberm. 3: 248, 1838 (pp). *Lejeunea* Nees, Syn. Hep. 314 (pp). *Symbiezidium* Trev. Mem. Ist. Lomb. 3, 4: 403, 1877 (pp); Gottsche, *Mex. Leverm.* 184, 1863 (pp). *Lejeunea* subg. *Lopho-Lejeunea* Spr. 119.

L. subfusca (Nees) Steph. Hdw. 29: 16, 1890 (nec Spr. 112); Mizutani in J. Hattori bot. Lab. 24: 180, f. 12 (14-23), 1961. *Jungermannia subfusca* Nees, Hep. Java 36. *Phragmicoma subfusca* Nees in Syn. Hep. 315. *Lejeunea subfusca* Nees, Syn. Hep. 315; Mitt., 110. *Symbiezidium subfuscum* Trev. op. cit. 403. *Lopholejeunea sundaica* Steph. Hdw. 35: 112, 1896. *L. sagraena* (Mont.) Spr. var. *subfusca* Schiffn. *Conspec.* 294, 1898. *Mastigolejeunea andreana* Steph. 4: 778. *Lopholejeunea asiatica* Steph., *L. pyriflora* Steph. 5: 82, 88. *L. levieri* (nec levieri Mass.) Schiffn. in Ann. bryol. 6: 134, 1933.

India (SI), Ceylon, Sumatra, Penang, Java, Malaya, Borneo, Philippines, New Guinea, Br. Honduras, Africa, N. & S. America, New Caledonia, Tahiti.

Lopholejeunea eulopha (Tayl.) Spr. 120; Schiffn. in Forsch. Gaz. 4: 28, pl. 1, 2, 1890. *Lejeunea eulopha* Taylor in Lond. J. Bot. 5: 391, 1846. *Phragmicoma immersa* Mitt. Fl. Viti. 412. *P. eulopha* Mitt. op. cit. 413. *Lejeunea fimbriata* G. in Müller, Fragm. Phytog. Austr. 9: 64, 1880. *Lopholejeunea norfolkiensis* Steph., *L. nicobarica* Steph. *L. nymanii* Steph., *L. novoguineae* Steph., *L. cranstonii* Steph., *L. immersa* Steph., *L. vescoana* Steph., *L. laceriloba* Steph. 5: 84. 90, 91, 93, 94, 96; 6: 379. *L. lacerifolia* Steph., *Lejeunea renistipula* Steph., *Lopholejeunea hispida* Steph. all in sched.

India (Nicobar Isls.), Malaya, Sumatra, Java, Borneo, Philippines, New Guinea, Norfolk Isls, Pacific Isls, New Caledonia, Samoa, Tahiti, Ceylon, Br. Honduras, Japan, N. & S. America, Africa.

L. sikkimensis Steph. 5: 87. *Lejeunea aemula* Schiffn. in Verd. Ann. bryol. suppl. 4: 78, 1934.

India.

From continental Japan and Asia are three related species described: **L. sikkimensis** Steph. (=*L. aemula* Schiffn.), **L. liukiuensis** Steph. and **L. brunnea** Horik. Whether **L. sikkimensis** represents a proper species, I could not say with certainty as I had only some branches at my disposal.—Verd. in Ann. bryol. suppl. 4: 81, 1934.

L. applanata (R.B.N.) Steph. Hdw. 29: 14, 1890. *Jungermannia applanata* R. B. N. Nova Acta 12: 210, 1824. *Phragmicoma applanata* Nees, Nat. Eur. Leberm. 3: 248, 1838. *Lejeunea applanata* in Syn. Hep. 314; Goebel in Ann. Jard. Bot. Beitenz. 7: 26, f. 10, 1887. *Lopholejeunea levieriana* Mass. *Hep. Schensianae,* 36 pl. 10, f. 14, 1897. *L. fleischeri* Steph. 5: 79. *L. lamii* Reim, Hdw. 69: 114, 1929. *L. apiculata* Steph. in sched. *Symbiezidium applantum* Trev. Mem. Ist. Lomb. 3(4): 403, 1877.

India (H, S, KH), Ceylon, China, Japan, Sumatra. Borneo, New Guinea.

Marchesenia Gray Nat. Arr. Brit. pl. 1: 689, 1821; Carruthers in J. Bot. 3: 301, 1865. *Lejeunea* subg. *Phragmicoma* Mitt. in Trans. Linn. Soc. Bot. Lond. 23: 58, 1860 (pp). *Homalolejeunea* Steph. Hdw. 27: 112, 1889 (pp). *Phragmicoma* Dum. Comm. Bot. 112. *Marchesinia* Trev. Mem. Ist. Lomb. 3, 4: 405, 1877 (pp.). *Lejeunea* subg. *Homalo-Lejeunea* Spr. 132 (pp.); Steph. Hdw. 29: 14, 1890 (pp.).

M. gigantea Steph. 5 : 154 ... ... S
M. sikkimensis Steph. 5 : 155 ... ... S

Archilejeunea (Spr.) Schiffn. in Engler and Prantl. Nat. Pflanzenfam. 1(3): 130 (pp.), 1887; Verd. in Ann. bryol. suppl. 4: 44, 1934. *Jungermannia* in Syn. Hep. 130 (pp). *Phragmicoma* Mitt. Fl. viti. 412 (pp). *Thysananthus* Tayl. Mem. Ist. Lomb. 3 4: 403 (pp). *Lejeunea* subg. *Archi-Lejeunea* Spr. 88.

A. indica Steph. 4: 728; Verd. *op. cit.* 47.

India (Mangalore).

A. mariana (G.) Steph. 4: 729; Verd. *op. cit.* 48. *Lejeunea mariana* G., Spec. Hep. 337. *L. samoana* Mitt. Fl. viti. 415. *Archilejeunea samoana* Steph., *A. corcmuensis* Steph., *A. falcata* Steph., *A. eberhardtii* Steph., *A. gibbiloba* Steph., *A. owahuensis* Steph., A. *apiculifoila* Steph. 4. *A. treubiana* Schiffn. (nom. nud.) Hdw. 39: 207, 1800. *A. sericalyx* Herz. Mitt. Ist. allg. botan. Hamburg 7: 196, 1931. *A. subloba* Herz. *op. cit.* 196.

India (SI, IO, upper A), Siam, Annam, Taiwan, Sumatra, Java, West Borneo, Sarawak, Philippines. New Guinea, Mioko, Marianen, Yap, New Caledonia, Solomon Isls, Samoa, Cook's Isls, Hawaii.

Leucolejeunea Evans in Torreya 8: 225, 1907. *Jungermannia* Schw. Spec. Fl. Am. Sept. Crypt. 12, 1833 (pp). *Lejeunea* in Syn. Hep. 330-331 (pp). *Lejeunea* subg. *Archi-Lejeunea* Spr. 91.

L. xanthocarpa (L. et L.) Evs. *op. cit.* 229. *Jungermannia xanthocarpa* L. et L. Pug. 5: 8, 1833. *Lejeunea xanthocarpa* L. et L., Syn. Hep. 330. *Lejeunea* (*Archilejeunea*) *xanthocarpa* Pears. Krist. Vid. Selsk. För.-handl. 9: 4, pl. 14-24, 1887. *Archilejeunea xanthocarpa* Schiffn, *Conspec.* 316, 1898.

India (IO), Japan, Taiwan, China, Ceylon, Java. Borneo, Celebes, N. & S. America. Africa.

The following species deserve further examination:

L. turgida (Mitt.) Verd. in Ann. bryol. suppl. 4: 46, 1934. *Lejeunea turgida* Mitt. 110. *Arhcilejeunea turgida* (Mitt.) Steph. 4: 733.

India (H, S, KH).

L. sikkimensis (Steph.) Verd. *op. cit.* 46. *Archilejeunea sikkimensis* Steph. 4: 732.

India (S).

Ceratolejeunea (Spr.) Schiffn. in Engler & Prantl. Nat. Pflanzenfam. 1 (3): 125, 1887; Evans in Bull. Torrey bot. Clb. 32: 273, 1905. *Lejeunea* Hampe & G. in Linnæa 25: 352, 1852 (pp.) *Lejeunea* subg. *Cerato-Lejeunea* Spr. 198. *Neurolejeunea* Schiffn. *loc. cit.* 131 (pp).

C. cornuta (Lbdg.) Steph. 5: 403. *Lejeunea cornuta* Lbdg. cf. Steph. 5: 403.

India (IO), Trinidad, Guinea, S. America,

Ceratolejeunea singaporensis (Lbdg.) Steph. 5: 441. *Lejeunea singaporensis* Lbdg. cf. Steph. 5: 441.
India (Andaman Isls.), Singapore.

Hygrolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1 (3): 1887. *Lejeunea* subg. *Hygro-Lejeunea* Spr. 230.

H. lindberghii (G.) Steph. 5: 553. *Lejeunea lindberghii* G. Syn. Hep. 336. *Jungermannia filiformis* L. et L. in Lehm. Pug. 4:6.
India (H, S), Nepal.

H. nicobarica (G. mss) Steph. 5: 564.
India (Nicobar Isls.).

Taxilejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1 (3): 125, 1887; Evans in Bull. Torrey bot. Clb. 48: 107, 1921. *Omphalanthus* sect. 2, in G.L.N. Syn. Hep. 303 (in large part). *Lejeunea* G.L.N. *op. cit.* 308 (pp). *Lejeunea* subg. *Taxi-Lejeunea* Spr. 212.

T. himalayensis Herz. in Ann. bryol. 12: 86, f. 8(g-k), 1939.
India (S).

T. laxiretis (Steph.) Eifrig in Ann. bryol. 9: 102, f. 13 (2, a-d), 1936. *Hygrolejeunea amboinensis* Schiffn. in above. *H. javanica* Steph., *H. nicobarica* Steph., *H. laxiretis* Steph. (in sched.).
India (Nicobar Isls).

T. obscura (Mitt.) Eifrig, *op. cit.* 93, f. 6 (3, a-d). *Hygrolejeunea obscura* (Mitt.) Steph. 5: 565. *Lejeunea obscura* Mitt. 112.
India (S), Nepal.

Other species mentioned in Stephani.

T. stevensiana Steph. 5 : 507	S, H
T. tenerrima Steph. 6 : 406	SI
T. cuspidata Steph. in Schiffn. *Oest. bot. ziet.* 3 : 1, pl. 1, 1899	B

Cheilolejeunea (Spr.) Schiffn. emend Mizutani in Engler & Prantl, Nat. Pflanzenfam., 1 (3): 124, 1887; Evans in Bull. Torrey bot. Clb. 33: 1, 1910; Mizutani in J. Hattori bot. Lab. 27: 138, 1964. *Lejeunea* subg. *Strepsi-Lejeunea* Spr. 179. *Lejeunea* subg. *Euosmo-Lejeunea* Spr. 241. *Lejeunea* subg. *Cheilo-Lejeunea* Spr. 251. *Euosmolejeunea* (Spr.) Schiffn.; *Strepsilejeunea* (Spr.) Schiffn. *op. cit.*, 124. *Pycnolejeunea* sensu Hoffman et Steph. (*p. m. p.*) in Ann. bryol. 8: 80-129, 1935.

subg. **Cheilolejeunea** Spr.

C. (C.) birmensis (Steph.) Mizutani in J. Hattori bot. Lab. 27: 139, f. 1 (1-10), 1964. *Strepsilejeunea birmensis* Steph. 5: 286. *Cheilolejeunea capillacea* Steph. 5: 663. *C. rigida* Steph. 5: 670.
India (IO), Burma.

C. (C.) laeviuscula (Mitt.) Steph. 5: 668; Mizutani, *op. cit.*, 26: 178, f. 4 (10-19), 1963. *Lejeunea lavieuscula* Mitt. 114.
India (S).

C. (C.) serpentina (Mitt.) Mizutani, *l.c.* 26: 171, f. 1 (1-8), 1963, *Lejeunea serpentina* Mitt. 112. *Euosmolejeunea serpentina* (Mitt.) Steph. 5: 590.
Ceylon.

C. (C.) subopaca (Mitt.) Mizutani, *l.c.* 26: 183, f. 6 (1-9), 1963. *Lejeunea subopaca* Mitt. 116.
India (KH).

subg. **Xenolejeunea** Kachroo & Schuster, in J. Linn. Soc. Lond. Bot. 56: 496, 1960. *Pycnolejeunea* Hoffmann, Ann. bryol. 8: 80-129, 1935; Steph., 5: 597 (in large part).

C. (X.) ceylanica (G.) Schuster & Kachroo, *op. cit.* 509. *Lejeunea ceylanica* G. in Syn. Hep. 319. *L. connivens* G. in Schiffn. Gaz. Exped., 1889. *Pycnolejeunea ceylanica* (G.) Steph. 5: 621.
India (H).

C. (X.) incisa (G.) Schuster & Kachroo, *op. cit.* 509. *Lejeunea incisa* G. in Syn. Hep. 360. *Pycnolejeunea incisa* (G). Steph. 5: 624.
India (S).

C. (X.) imbricata (Nees) Schuster & Kachroo, *op. cit.* 509, f. 3(4, 5). *Jungermannia thymifolia @ imbricata* Nees, Hep. Javan. 42, 1830. *Lejeunea imbricata* (Nees) G. in Syn. Hep. 359. *Lejeunea* (*Pycnolejeunea*) *imbricata* (Nees) Steph. Hdw. 29: 77, 1890. *Pycnolejeunea imbricata* (Nees) Steph. in Bull. Herb. Boiss. 5: 80, 1897. *P. tosana* Steph., *P. fauriana* Steph., *P. japonica* Steph. 5: 94, 622, 628. *P. okamurana* Steph. in Yoshinaga, Bot. Mag. Tokyo 20: 54, 1906. *Cheilolejeunea imbricata* (Nees) Mizutani in J. Hattori bot. Lab. 24: 196, f. 16 (14-28), 1961. *Strepsilejeunea planifolia* Steph. 6: 396.
India (IO), Japan, Bonin, Taiwan, Borneo, Sumatra, Java and New Guinea.

subg. **Euosmolejeunea** Spr. *Euosmolejeunea* (Spr.) Schiffn. *op. cit.* 124.

C. (E.) bruneana (Steph.)
India (S).

C. (E.) orientalis (G.) Kachroo comb. novo. *Lejeunea orientalis* G. *Euosmolejeunea orientalis* (G.) Steph.
India (H).

subg. **Strepsilejeunea** Spr. *Lejeunea* subg. *Harpa-Lejeunea* sectio *Strepsilejeunea* Spr. 168. *Trachylejeunea* Steph. 5: 303 (pp.). *Strepsilejeunea* (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 127, 1887; Stephani, Hdw. 35: 19; 5: 273 (pp.).

Cheilolejeunea (S.) khasiana (Mitt.) Steph. 6: 395 *Lejeunea khasiana* Mitt. 115.
India (KH).

C. (S.) neelgherriana (G.) Steph. 5: 288. *Lejeunea neelgherriana* G. Syn. Hep. 354; Mitt. 115.
India (S, KH, Nilgiri), Nepal.

C. (S.) papillata Herz. in Ann. bryol. 12: 85, f. 8 (a-f), 1939.
India (H).

C. (S.) durellii Schiffn. Oestr. bot. zeit. 3: 1, 1899.
India (Bhutan).

Pycnolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam., 1(3): 124, 1887; Evans in Bull. Torrey bot. Clb. 33: 19, 1906; Kachroo & Schuster in J. Linn. Soc. Lond. 56: 479, 1960. *Lejeunea* Hampe & Gottsche in Linnaea 25: 358, 1862; Mont. Ann. Sci. Bot. 2, 19: 260, 1843; G. L. N. Syn. Hep. 359 (pp.). *Lejeunea* subg. *Pycnolejeunea* Spr. 245.

P. sphaeroides (Sde.-Lac.) Steph. 5: 620
Lejeunea sphaeroides Sde. La-c.,cf. above. ... IO
P. grossiloba Steph. 5: 629. ... ... IO
P. nicobaricae Steph. Hdw. 126, 1896
(sterile material). ... Nicobar. Isls.
P. firma (Mitt.) Steph. 5: 637 ... ... IO, KH

Lejeunea firma Mitt. 112: "(Amphigastria bifida, folia orbiculata group). Caule gracile vix unciali vage paree ramoso, foliis divergentibus oblongis, apice rotundatis, lobulo ad marginis ventralis dimidum producto unidentato, amphigastriis parvis rotundatis breviter bifidis, perianthio oblongo obovato compresso dorso univentre bicarinato.

L. catenulatae Nees ab E. forme directioneque foliorum similis, sed amphigastriis diversis, folia vel sicco vel humido vix mutantur."

Rectolejeunea Evans in Bull. Torrey bot. Clb. 33: 8, 1906. *Lejeunea* G. L. N. Syn. Hep. 308 (pp.). *Lejeunea* subg. *Cheilolejeunea* Spr. 251 (pp.). *Cheilolejeunea* Schiffn. in Engler & Prantl, Nat. Pflanzenfam., 1(3): 124 (pp.), 1887.

R. aloba (Sde.-Lac.) Steph. 5: 696; Pande *et al.* in J. Indian bot. Soc. 22: 162, f. 12-20, 1943. *Lejeunea aloba* Sde. Lac., in Syn. Hep. Java 72. *Eulejeunea aloba* (Sde.-Lac.) Schiffn. Conspec. Hep. 247.
India (SI), Java, Samoa, Nova Hebridae.

R. subacuta Steph. 5: 700 ... ... H

Harpalejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 116, 1887; Evans in Bull. Torrey bot. Clb. 30: 544, 1903. *Lejeunea* subg. *Harpa-Lejeunea* sectio *Cardiostipa* Spr. 164.

H. indica Steph. 6: 392; Rao & Udar in J. Indian bot. Soc. 36: 329, f. 4-7, 1957.
India (SI).

Prionolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 127, 1887; Evans in Bull. Torrey bot. Clb. 31: 211, 190. *Lejeunea* subg. *Priono-Lejeunea* Spr. 154. *Lejeunea* G. in G. L. N. Syn. Hep. 338 (pp.).

P. hortlessiana Steph. 5: 226. ... ... S
P. pulla (Mitt.) Steph. 5; 226 ... ... H,S,N
(perianth not known).

Lejeunea pulla Mitt. 116: (Folia denticulata group)—Caule repente effuso parvulo, foliis patentibus oblongo-ovatis acutis dentatis, lobulo tumidulo unidentato, ad dimidium marginis ventralis metiente, amphigastriis profunde bifidis, laciniis lanceolatis, foliis involucralibus lacero-dentatis.

A *L. calcarea* quocum magnitudine convenit, colore fusco foliisque oblongo-ovatis laevibus, nec acuminatis, differt.

Drepanolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 126, 1887. *Jungermannia* Meissn. in Pug, 5: 19, 1833 (pp.). *Lejeunea* Hampe & G. in Linnaea 25: 356, 1852 (pp.); Tayl. in Lond. J. Bot. 5: 393, 1846 (pp.). *Lejeunea* subg. *Drepano-Lejeunea* Spr. 186.

D. foliicola Horikawa in J. Sci. Hiroshima Univ. B, 2, 1: 85, 1933; Pande *et al.* in J. Indian bot. Soc. 36: 341, f. 19-24, 1957; Mizutani in J. Hattori bot. Lab. 24: 221, f. 23 (7-23). 1961. *Drepanolejeunea serrulata* Horikawa, *op. cit.* 202, pl. 25 (13-17), 1933.
India (EH, upper A), Japan, Taiwan.

D. termatens (G.) Steph. 5: 353; Mizutani, *op. cit.* 225, f. 25. *Lejeunea ternatens* G. in G. L. N., Syn. Hep. 346. *Drepanolejeunea unidentata* Horikawa in Bot. Mag. Tokyo 49: 589, f. 23, 1935.
India (H), Japan, Taiwan, Java, Moluccas, Australias, Norfolk Isls, Samoa.

D. tenuis (R. B. N.) Schiffn. Conspec. Hep. Archip. India 280, 1898; Mizutani in J. Hattori bot. Lab. 26: 182, 1963. *Jungermannia tenuis* R. B. N. Nova Acta Caes. Leop. Carol. 12: 226, 1824. *Lejeunea angustifolia* Mitt. 116.
India (S?, H).

Leptolejeunea (Spr.) Schiffn. in Engler & Prantl. Nat. Pflanzenfam. 1(3): 26, 1887; Evans in Bull. Torrey bot. Clb. 24: 496. *Lejeunea* subg. *Lepto-Lejeunea* Spr. 195. *Jungermannia* L. et L. Pug.

5: 13, 1833 (pp.). *Lejeunea* L. et L. Syn. Hep. 403 (pp.). *Colura* Trev. Mem. Ist. Lomb. 3, 4: 404, 1877 (pp.).

Leptolejeunea himalayensis Pande et Misra in J. Indian bot. Soc. 22: 168, f. 37-43, 1943.
India (EH).

L. schiffneri Steph. Hdw. 107, 1896; 5: 386; Pande et Misra, *loc. cit.* 36: 338, f. 14-18, 1957.
India (H, SI).

L. dapitana Steph. 5: 379; Pande *et al. op. cit.* 338.
India (SI).

L. balansa Steph. 5: 377, Hdw. 105, 1896.
India (Andaman Isls).

L. subacuta Evans, cf. Robinson in J. Hattori bot. Lab. 27: 130, 1964.
India.

L. erecta Steph. 5 : 380	...	...	S
L. spathulifolia Steph. 5 : 170	...	...	S

Lejeunea Libert in Ann. Gen. Sci. Phys. 6: 372, 1820.

L. appendiculata Mitt. 113; Mizutani in J. Hattori bot. Lab. 26: 175, f. 3 (1-9), 1963. *Pycnolejeunea* (?)*appendiculata* (Mitt.) Steph. 5: 634.
India (S).

L. cavifolia (Ehrh.) Lindb. Acta Soc. Sci. Fenn. 43, 1871; Schuster in Amer. Midl. nat. 49: 557, pl. 69 (7, 8), 1953. *Jungermannia cavifolia* Ehrh. Beitr. 4: 45, 1775. *Lejeunea serpyllifolia* Libert. *op. cit.*, 374. *L. serpyllifolia* var. *americana* Lindb. in Acta Soc. Sci. Fenn. 10: 485, 1875. *Eulejeunea serpyfolia* Schiffn. in Nat. Pflanzenfam. 1, 3: 112. *E. cavifolia* Gill. Fl. Iberica 707, 1919.
India (H).

L. boninensis Horikawa, cf., Robinson in J. Hattori bot. Lab. 27: 129, 1964.
India (upper A), Japan.

L. flava (Sw.) Nees, Nat. Europ. Leberm. 3: 277, 1838; Mizutani in J. Hattori bot. Lab. 24: 207, f. 20, 1961. *Jungermannia flava* Sw. Prodr. Eur. Fl. Ind. Occid. 144, 1788. *Lejeunea* subg. *Eu-Lejeunea flava* (Sw.) Spr. 268. *Eulejeunea flava* (Sw.) Schiffn. Nat. Pflanzenfam. 1, 3: 122, 1887.
India (S, SI), Japan, Taiwan, Sumatra, Europe Madeira, N. America, Jamaica.

L. flexuosa Mitt. 114: Mizutani, *loc. cit.* 26: 18 f. 5 (1-7), 1963.
India, (S, KH, SI), Nepal.

L. lowriana Steph. 5: 782: Mizutani, *loc. cit.* 27: 145, f. 3 (11-16).
India (Coorg).

L. mittenii Mizutani in J. Hattori bot. Lab. 26: 180, 1963; Hattori (1968).
India (EHN, KH), Burma.

L. obfusca Mitt. 114; Mizutani, *loc. cit.* 26: 178, f. 4 (1-9), 1963.
India, Ceylon.

L. olivacea Steph. Hdw. 29: 137, 1890 (nom. nud.); 5: 782; Mizutani, *loc. cit.* 27: 145, f. 3 (17-25), 1964. *Pycnolejeunea subacuta* Steph., 5: 700 (nec *Lejeunea subacuta* Mitt. 113).
India (S).

L. punctiformis Tayl. in G. L. N. Syn. Hep. 767 Mizutani, *loc. cit.* 27: 215, f. 22 (1-10), 1961. *Microlejeunea punctiformis* (Tayl.) Spr. cf. Steph. 5: 832.
India, Ceylon, Taiwan, Japan.

L. subacuta Mitt. 113; Mizutani, *loc. cit.* 26: 172, f. 1 (9-17), 1963.
India (S), Ceylon.

L. wallichiana Lehm. Nov. & Min. Cogn. Strip. Pug. 3: 5, 1831; Mizutani, *loc. cit.*, 27: 146, f. 4 (1-6); Steph. 5: 792.
India (H).

L. wightii Lindb. in G. L. N. Syn. Hep. 379; Mizutani, *loc. cit.* 27: 147, f. 4 (7-11).
India (SI, S, WH, H), Nepal.

Other species mentioned in Stephani are:

L. laeta L. et L., cf Steph., 5 : 780	...	IO
L. nepalensis Steph. 5 : 780	...	N
L. stahliana Steph. 5 : 788	...	S
L. tuberculata Steph. 5 : 790	...	S
L. perrottetii Steph. Hdw. 93, 1896; 5 : 785	...	SI

Additional species mentioned in Mitten (pp. 116-118) are: Lejeunea, Amphigastria bifide, Folia acuta.

L. subopaca Mitt. (Folia denticulata)—Caule repente vage ramoso exili, foliis oblongo-ovatis acutis ubique erose-crenulatis, cellulis subopacis, lobulo parvo inflexo ad tertiam folii patem protracto, amphigastriis parvis ovato-rotundatis, ad medium bifidis.

L. serpyllifoliae quod magnitudinem similis, *L. denticulatae* vero propinquior, attamen foliis longioribus acutioribus opacioribusque recedens...(KH).

L. khasiana Mitt. (Folia acuta group)—Caule procumbente vage ramoso semunciali, foliis divaricatis, ovatis, apice angulatis acutisque, lobulo parvo inflexo, amphigastriis parvis orbiculatis, ad medium bifidis, perianthio obovato subelliptico retuso compresso, dorso univentre bicarinato.

L. rufescenti similis, sed foliis omnibus angulatis acutis et perianthio medium versus latiore discendens . . . KH.

Transferred to Strepsilejeunea by Steph. 6: 395.

subg. **Microlejeunea** Spr. 287. *Microlejeunea* (Spr.) Jack & Steph. Bot. Centralbl. 40: 11, 1894.

Leptolejeune (M.) punctiformis (Tayl.) Spr. 287. *Microlejeunea punctiformis* Steph. 5: 832 ; Hattori in Bull. Tokyo Sci. Mus. 11: 121, f. 73, 1944 ; Mizutani in J. Hattori bot. Lab. 24, f. 22 (1-10), 1961 (as *Lejeunea punctiformis* Tayl.).
India (IO), Japan, Taiwan, Ceylon.

L. (M.) gracillima (Mitt.) *Lejeunea gracillima* Mitt 115 *Microlejeunea gracillima* (Mitt.) Carr. et P. Hep. Natalens 7, 1886.
India (IO).

Other species of *Microlejeunea* mentioned in Stephani:

M. aligera (Mitt.) Steph. 5 : 827	...	IO, KH
longirostris Steph. 6 : 422	...	S
inflatiloba Steph. 6 : 422 (sterile)	...	IO
nepalensis Steph. 5 : 832	...	N
ulcina (Tayl.) Spr. cf. Steph. 5 : 832	...	SI

L. aligera Mitt. 113. (Serpyllifoliae group)—Caule minuto pallido, foliis erecto-patentibus ovatis obtusis, lobulo ovato tumido, dimidium folii aequante, amphigastriis subrotundis bifidis perianthio ovato-oblongo obtuso compresso, quinqueplicato, foliis involucralibus lobis subaequalibus acutis, a basi ad excisuram lobulorum latiuscule alatis, ala integerrima angulatave.
Facies *L. minutissimae; a L. appendiculata* foliis involucralibus vere alatis distincta. ... KH.

Cyrtolejeunea (Spr.) Evans in Torrey bot. Clb. Bull. 30: 553, 1903. *Lejeunea* subg. *Harpalejeunea* Spr. 171.

C. holostipa (Spr.) Evans, *op. cit.* 553, pl. 21 (10-23). *Lejeunea* (*Harpalejeunea*) *holostipa* Spr. 171.—L. (*Microlejeunea*) *holostipa* Spr. in J. Linn. Soc. Bot. Lond. 30: 348, 1894. *Archilejeunea pseudocucullata* Steph. Hdw. 34: 61, 1895. *Euosmolejeunea pseudocullata* Steph. Bot. Jahrb. 23: 583, 1897 (also *Lejeunea pseudocucullata* G. as synonym).
India (IO), Central & S. America.

Otigoniolejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 127, 1887. *Lejeunea* subg. *Otigonio-Lejeunea* Spr. 227.

O. indica Steph. 6 : 488	... ...	IO

Colura Dum. Rec. d'Obs. 12, 1835.

C. ornata (Goebel) Steph. 5: 940. *Lejeunea ornata* Goebel in Ann. Jard. Buit 9. *Colurolejeunea ornata* Schiffn. in Nat. Pflanzenfam. 1(3): 121, 1887.
India (IO).

Cololejeunea (Spr.) Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 121, 1887. *Lejeunea* subg. *Colo-Lejeunea* Spr. 291. *Cololejeunea* subg. *Physocolea* Schiffn. *op. cit.* 122. *Cololejeunea* Evans in Bull. Torrey bot. Clb. 38: 251, 1911. *Physocolea* Steph. 5: 863.

C. minuta subsp. **minutissima** (Smith) Schiffn. *op. cit.* 122 ; Evans in Mem. Torrey bot. Clb. 8: 166. *Jungermannia minutissima* Smith in Sowerby, Eng. Bot. pl. 1633, 1806. *J. incospicua* Raddi in Mem. Mat. e Fis. Soc. Ital. Sci. Mod. 13: 34, Pl. 5, f. 2, , 1820. *Lejeunea minutissima* Dum. Comm. Bot. 111 ; G. L. N. Syn. Hep. 387. *Jungermannia parvula* Wils. et Hook. in Dum. Musc. Amer. St. Merid. 172, 1844. *Lejeunea taylori* Spr. in Ann. Nat. Hist. ser. 2, 4: 116, 1849. *L. inconspicua* De Not in Mem. Ac. Tor. ser. 2, 22: 386, Pl. 5, f. 27. *L. parvula* Aust. in Lindb. Acta Soc. Sci. Fenn. 10: 481, 1875. *Lejeunea* (*Cololejeunea*) *parvula* Steph. Bot. Gaz. 17: 171, 1892. *Cololejeunea inconspicua* Massal. Atti Ist. Veneto 71: 1,275, 1912. *Physocolea minutissima* Steph. 5: 914. *Aphanolejeunea minutissima* Horikawa in J. Sci. Hiroshima Univ. B, 2, 2: 283, 1934.
India (SI), Japan, China, Africa, Europe, A. America. "Horikawa (1934) reports the species from eastern India and from Bonin and Liukiu Isls of Japan (*s. lat*). Whether these reports are based on plants referable to subsp. *minutissima* is totally uncertain" (Schuster in *J. Elisha Mitchel scient. Soc.* 71: 228, 1955).

C. hispidissima (Steph.) Herz. in Ann. bryol. 4: 94, 1931 : Pande & Misra in J. Indian bot. Soc. 22: 164, f. 21-26, 1943 (on close examination may turn out to be identical with *C. venusta*). *Physocolea hispidissima* (Steph.) Herz. *op. cit.* 94. *Leptocolea hispidissima* Steph. 6: 423.
India (SI).

C. venusta (Sde.-Lac.) Kachroo in J. Univ. Gauhati 2(1): 31, f. 1-19, 1951. *Physocolea venusta* (Sde.-Lac.) Steph. 5: 907. *Lejeunea venusta* Sde.-Lac. in Syn. Hep. Java 64.
India (EH, A).

C. wightii Steph. Hdw. 253, 1895. *Physocolea wightii* Steph. 5: 909.
India (IO), Pulo Penang, New Guinea.

C. spinosa (Horikawa) Hattori in Bull. Tokyo Sci. Mus. 11: 102, 1944 ; Mizutani in J. Hattori bot. Lab. 26: 260, f. 33 (1-15), 1961. *Physocolea spinosa* Horik. in J. Sci. Hiroshima Univ. B, 2,

1: 70, f. 9, 1931. *Cololejeunea indica* Pande & Misra in J. Indian bot. Soc. 22: 164, f. 27-32, 1943.
India (EH), Japan, Ryuku.

Cololejeunea longifolia (Mitt.) Benedix in Feddes Rep. 134: 15, 1953; Mizutani in J. Hattori bot. Lab. 26: 184, 1963. *Lejeunea longifolia* Mitt. 117. *Cololejeunea minuta* (Mitt.) Steph. in Bull. Herb. Boiss. 5: 79, 1897. *Physocolea aculata* Steph. 5: 887. *P. longifolia* (Mitt.) Steph. 5: 898. *P. minuta* (Mitt.) Steph. 5: 899. *P. leptolejeunoides* Schiffn. in Ann. bryol. 2: 95, 1929. *P. oblonga* Herz. cf. Mazetti, Sym. Sinic. 5: 55, 1930.
India (S, H).

The following species have been transferred to *Physocolea* by Stephani, but these require restudy before they are finally accepted in *Cololejeunea* or elsewhere.

Lejeunea diaphana G. mss. cf. Steph. 5 : 908 ... Anadaman Isls.

Physocolea trianguliloba Steph. 5 : 907 ... SI
(perhaps Mitten's *L. trianguliloba*!)

L. angustifolia Mitt. 116 ... S

(Folia acuta group)—Caule gracillimo capillari fusco parce ramoso, foliis e recto-patentibus, lanceolatis acuminatis incurvis, lobulo magno ovato tumido bidentulo, amphigastriis nullis.

(Gracillima, vix oculis nudis conspicua).

L. producta Mitt. 117 ... S

(Examphigastriata group)—Caule effuso brevi pleniusulo pallido, foliis ovatis, apice rotundatis, lobulo basi saccato lingulato cauli parallelo, amphigastris nullis, at eorum loco punctis radicellarum ad basin foliorum omnium obviis, perianthio obovato compresso, dorso convexo, ventre bicarinato.

[Habitus et magnitudo *L. albofoliae* et *L. unidentatae*; forma auten lobulorum singularis, Radulam lingulatam referns.]

L. diversifolia Mitt. 118 ... IO, EH

(Acrogonia group)—Epiphylla, caule effuso intricato fusco, foliis patentibus lingulatis, basi angustatus, apice rotundatis angulatis aculis subtruncatisve, cellulis heteromorphis binis trinisve in seriem disposits, lobulo parvo bidentulo incurvo, amphigastriis nullis, punctis radicellarum duplicatis.

Ad basim foliorum omnium fasciculus haustellorum invenituriis congruentium quae in speciebus amphigastriis duplicatis obvia.

[According to Herzog (cf. Pande et Misra in Proc. nat. Acad. Sci. (India) 13(1): 29, 1943. *Lejeunea producta* Mitt. belongs to *Leptocolea*].

Leptocolea (Spr.) Evans in Bull. Torrey bot. Clb. 38: 261, 1911. *Lejeunea* subg. *Cololejeunea* sectio *Leptolejeunea* Spr. 292. *Cololejeunea* subg. *Leptocolea* Schiffn. in Engler & Prantl, Nat. Pflanzenfam. 1(3): 122, 1887.

L. lanciloba (Steph.) Evans, *op. cit.* 186; Pande & Misra, in J. Indian bot. Soc. 22: 160, f. 1-11, 1943: Kachroo in J. Univ. Gauhati 2: 36, f. 20-31, 1951. *Cololejeunea lanciloba* Steph. Hdw. 34: 250, 1895; Evans in Trans. Conn. Ac. 10: 452, Pl. 50 (1-7), 1910: Mizutani in J. Hattori bot. Lab. 24: 248, f. 29 (13-27), 1961.
India (SI, A), Japan, China, Nicobar Isls, New Caledonia, N. America.

L. jelineckii Steph. 5 : 851 ... Nicobar Isls.

L. marginata (L. et L.) Evans, cf. Chopra in Proc. Indian Acad. Sci. 7B: 250, 1938.
India (SI).

L. ocellata Horikawa in J. Sci. Hiroshima Univ. B, 2, 1: 85, 1931; Chopra, *op. cit.* 250.
India (SI), Japan.

L. himalayensis Pande & Misra in Proc. nat. Acad. Sci. (India) 13B: 27, f. 1-15, 1943.
India (WH).

L. rupicola Pande & Misra in Proc. 26th Indian Sci. Congr. 119, 1939 (resembles **L.** *lanciloba* and *L. plenifolia* except in shape of lobule).
India.

L. acrotremae (Schiffn.) Steph. 5: 847. *Cololejeunea goebelii* var. *acrotremae* Schiffn. in above.
India (H).

Taeniolejeunea Zwickel in Ann. bryol. 6: 106, 1933.

L. affinis (Schiffn.) Zw. *op. cit.* 107; Pande *et al.* in J. Indian bot. Soc. 36: 336, f. 1-6, 1957. *Physocolea peraffinis* Schiffn. cf. Steph. 5: 900. *Cololejeunea peraffinis* Schiffn. Acad. Leop. 242, 1893. *Leptocolea floccosa* var. *peraffinis* (Schiffn.) Herz. *L. peraffinis* (Schiffn.) Horikawa in J. Sci. Hiroshima Univ. B, 2, 2: 280, 1934.
India (SI), Japan, Taiwan, Malacca, Java, Sumatra, Borneo, Celebes, Philippines.

T. pseudofloccosa (Horik.) Hattori in J. Jap. Bot. 17: 457, 1941; Pande *et al. op. cit.* 338, f. 7-13. *Leptocolea pseudofloccosa* Horikawa, *loc. cit.* 2, 1: 87. *Cololejeunea pseudofloccosa* (Horik.) Benedix in Feddes Rep. 134: 36, 1953.
India (S), Taiwan, Japan, Sumatra, Java, Borneo.

T. appressa (Evs.) Zw. *op. cit.* 107; Hattori, *op. cit.* 461; Kodama in J. Hattori bot. Lab. 15: 103, 1955. *Cololejeunea appressa* (Evs.) Benedix *op. cit.* 31. *Physocolea appressa* Evans in Zw. *op. cit.*
India (Andaman Isls), Japan, Taiwan, Sumatra, Java, Jamaica.

Taeniolejeunea ocelloides (Horik.) Hattori. *op. cit.* 426. *Leptocolea ocelloides* Horikawa, *op. cit.* 280. India (H), Taiwan, Japan.

Aphanolejeunea Evans in Bull. Torrey bot. Clb. 38: 272, 1911. *Cololejeunea* (pp.) auct. (cf. Schuster in J. Elisha Mitchell scient. Soc. 71: 126, 1955).

Aphanolejeunea sp. Pande, Srivastava & Ahmad in J. Indian bot. Soc. 36: 346, 1957.
India (EH).

"The genus has not been accepted by some recent workers (Mcvicar, 1926; Frye & Clark, 1947, Goebel, 1928). Goebel (Ann. Jard. Bot. Biutenzorg, 39: 34, 1928) stated that the position of the hyaline papilla in *Aphanolejeunea* (as well as in *Cololejeunea* and *Leptocolea*) is originally terminal on lobule, and remains so in imperfectly developed leaves. As Evans (1938, p. 72) emphasizes, 'in most cases, however, one or more cells adjacent to the papilla grow out and form the apical tooth, thus displacing the papilla to one side....According to writer's interpretation, however, the papilla is displaced to the proximal side of the apical tooth in *Cololejeunea* and *Leptocolea* and to the distal side in *Aphanolejeunea*'. Evans also held laid emphasis on as a generic character of *Aphanolejeunea* 'on the fragility of the plant and the marked heterophylly of the leaves'. In the opinion of the writer, the heterophylly of the leaves scarcely allows separation of *Aphanolejeunea* from such species as *Cololejeunea diaphana* (which are further scarcely less delicate). The position of the hyaline papilla, although constant by itself is scarcely sufficient to warrant retention of the genus as distinct from *Cololejeunea*. Consequently, the claims of *Aphanolejeunea* for generic recognition leave much to be desired; further future reduction to subgeneric standing under *Cololejeunea* may prove desirable"—Schuster *op. cit.*, p. 127.